

REMARKS

Claims 1-4, 7-9, 11-16, 18-21, 24-25, 27-28, and 30-39 are pending in the application.

Claims 1-4, 7-9, 11-16, 18-21, 24-25, 27-28, and 30-39 stand rejected. Claims 1, 24, and 38 are independent claims.

Claims 37 and 39 are cancelled without prejudice or a disclaimer. Applicants respectfully submit that cancellation of the claims should not be construed as admission that each claim is not patentable.

35U.S.C. 112, first paragraph, Rejection

Claim 38 stands rejected under 35 U.S.C. 112, first paragraph, as allegedly failing to enable one of ordinary skill in the art how to make a parasitic antenna so that it is configured to provide parasitic damping.

Applicants respectfully submit that the claim does not recite that the parasitic antenna is configured to provide parasitic damping. Accordingly, the rejection appears inappropriate. Applicants respectfully request withdrawal of the rejection.

35U.S.C. 112, second paragraph, Rejection

Claims 1 and 38 stand rejected under 35 U.S.C. 112, second paragraph, as allegedly being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. According to the Patent Office, recitation of “a platen for... biasing the target with a negative voltage” and “a platen configured... to bias the target” is not clear.

Applicants amend claim 1 and 38 to recite “a platen for holding a target” and “a platen configured to hold a target,” respectively. The amendments should not be construed as admission that each claim is not patentable.

Applicants respectfully request withdrawal of the rejection on each claim.

35U.S.C. 102(b)Rejection

Claim 38 stands rejected under 35 U.S.C. 102(b) as allegedly being anticipated by Kadomura (U.S. 5,567,268) (“Kadomura I”).

Claim 38 recites, *inter alia*, “an RF antenna unit including... a vertically extending parasitic antenna coil... the vertically-extending parasitic antenna coil being without an electrical connection to a power source... wherein the vertically-extending parasitic antenna coil induces an RF current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber, the plasma comprising ions.”

According to the United States Court of Appeals for the Federal Circuit, a claim is anticipated only if a single prior art reference set forth each and every feature recited in the claim (*Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987)).

In rejecting claim 38, the Patent Office alleges that the loop antenna 22 disclosed in Kadomura I is equivalent to the vertically extending parasitic antenna and that Kadomura I sets forth, among others, the vertically extending parasitic antenna of claim 38 (present Office Action, page 4, line 1-11).

Applicants respectfully traverse the rejection on the following grounds. First, the loop antenna 22, is not a coil, much less a vertically extending coil. Second, Kadomura I explicitly teaches that if the first switch 35 is turned OFF such that the loop antenna 22 is not electrically coupled to the RF power supply 39, the loop antenna 22 DOES NOT GENERATE PLASMA in the plasma chamber (id., at line 37-41). In other words, Kadomura I, at most, sets forth a loop

antenna 22 that **DOES NOT** induce an RF current into the plasma chamber and excites and ionizes a process gas so as to generate plasma in the plasma chamber **if the loop antenna 22 is not electrically coupled to the RF power supply 39.**

Therefore, Kadomura I, in setting forth the loop antenna 22, does not set forth “an RF antenna unit including... a **vertically extending parasitic antenna coil**,... the vertically-extending parasitic antenna coil **being without an electrical connection to a power source**... wherein **the vertically-extending parasitic antenna induces an RF current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber**, the plasma comprising ions,” as recited in claim 38, and Kadomura does not anticipate claim 38. Applicants respectfully request withdrawal of the rejection.

Claim 38 stands rejected under 35 U.S.C. 102(b) as allegedly being anticipated by Kadomura (U.S. 6,096,160) (“Kadomura II”).

In rejecting claim 38 over Kadomura II, the Patent Office indicates that antenna coil 53 of the Kadomura II is equivalent to the vertically-extending parasitic antenna (present Office Action, page 5, line 13).

Kadomura II, as read by Applicants, discloses an apparatus comprising a loop antenna 52 that is electrically coupled to an RF source 66 and a pair of solenoid coils 53a and 53b that are electrically coupled to a DC source 68 (FIG. 5 and 6). However, nowhere does Kadomura II teach that each of the solenoid coils 53a and 53b is a vertically extending antenna coil. Kadomura II’s use of the term “coil” to label the solenoid coils 53a and 53b does not demonstrate that each of the coils 53a and 53b is vertically extending.

Kadomura II also teaches that each of the solenoid coils 53a and 53b is electrically coupled to the DC source 68 by a switch 67, which can be turned ON or OFF to electrically couple or decouple

the solenoid coils 53a and 53b to and from the DC source 68 (column 10, line 63 – column 11, line 2). However, nowhere does Kadomura II teach that the solenoid coils 53a and 53b, when not electrically coupled to the DC source, induces an RF current into the plasma chamber or excites and ionizes a process gas so as to generate a plasma in the plasma chamber. **On the contrary**, Kadomura II explicitly teaches that if “the switch 67 [coupling the solenoid coils 53a and 53b to a DC power source] is turned off, as shown in FIG. 6, **there is produced NO MAGNETIC FIELD in the bell jar 51**, such that no helicon wave plasma is generated” (id.). Although, a loop antenna 22, which is continuously coupled to the RF power supply to generate inductively coupled plasma (id.), Kadomura seems to teach that the solenoid coil 53a, when electrically decoupled from the DC power source, neither **induces an RF current into the plasma chamber nor excites and ionizes a process gas so as to generate a plasma in the plasma chamber.**

As such, Kadomura II does not set forth “an RF antenna unit including... a **vertically extending parasitic antenna coil**... the vertically-extending parasitic antenna coil **being without an electrical connection to a power source**... wherein **the vertically-extending parasitic antenna induces an RF current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber**, the plasma comprising ions,” as recited in claim 38, and Kadomura does not anticipate claim 38. Applicants respectfully request withdrawal of the rejection.

35 U.S.C. 103(a) Rejection

Claim 1 stands rejected under 35 U.S.C. §103(a) as allegedly being obvious over Kadomura I in view of the alleged Admitted Prior Art (the “APA”) or Trow (U.S. 5,824,607).

Claim 1 recites “an RF antenna unit including an active antenna and **a parasitic antenna**, the

parasitic antenna [that] is not electrically coupled to the RF source..., wherein each antenna of the RF antenna unit resonates RF current and induces electro-magnetic field... that excites and ionizes the process gas to generate a plasma within the plasma chamber..."

As noted in MPEP 2143(A), a rejection of a claim as allegedly being obvious cannot be sustained unless the Patent Office establishes that one or more references teach all features recited in the claim, "with the only difference between the [feature] and [one or more references] being lack of actual combination of the [feature] in a single [] reference" (see MPEP 2143(A)).

In rejecting claim 1, the Patent Office indicates that the multi-turn antenna 31 disclosed in Kadomura I is equivalent to the active antenna of claim 1 and the loop antenna 22 of Kadomura is equivalent to the parasitic antenna of claim 1 (present Office Action, page 7, line 1-10).

As noted above, the loop antenna 22 of Kadomura I DOES NOT induce an RF current into the plasma chamber and excites and ionizes a process gas so as to generate plasma in the plasma chamber if the loop antenna 22 is not electrically coupled to the RF power supply 39. Accordingly, Kadomura fails to teach "an RF antenna unit including an active antenna and a parasitic antenna, the parasitic antenna [that] is not electrically coupled to the RF source..., wherein each antenna of the RF antenna unit resonates RF current and induces electro-magnetic field... that excites and ionizes the process gas to generate a plasma within the plasma chamber," as recited in claim 1.

As Kadomura I fails to teach the RF antenna unit of claim 1, at least one of the APA and Trow must teach the RF antenna unit of claim 1 and remedy the deficiency of the Kadomura I. Otherwise, the combination of Kadomura I and one of APA or Trow will also lack the RF antenna unit of claim 1.

As noted in Applicants' previous response, the Related Art section of the present application

describes various apparatuses including chemical vapor deposition (CVD) apparatuses and plasma based processing apparatuses (citing U.S. Pat. No. 4,948,458, U.S. Pat. No. 5346,578, U.S. Pat. No. 5,540,800, U.S. Pat. No. 6,514,838, and U.S. Pat. No. 6,237,527)). However, nowhere in the Related Art section of the present application or the cited patent is there a disclosure of “an RF antenna unit including an active antenna and a parasitic antenna, the parasitic antenna [that] is not electrically coupled to the RF source..., wherein each antenna of the RF antenna unit resonates RF current and induces electro-magnetic field... that excites and ionizes the process gas to generate a plasma within the plasma chamber...” as recited in claim 1.

Trow, as read by the Applicants, discloses an inductively coupled plasma reactor. According to Trow, the only antenna 30 included in the plasma reactor comprises “an inductive antenna coil 30 which is powered by an RF supply and matching network 31” (Trow, column 4, line 4-8). Accordingly, Trow also fails to teach “an RF antenna unit including an active antenna and a parasitic antenna, the parasitic antenna [that] is not electrically coupled to the RF source..., wherein each antenna of the RF antenna unit resonates RF current and induces electro-magnetic field... that excites and ionizes the process gas to generate a plasma within the plasma chamber...,” as recited in claim 1.

As neither the APA nor Trow teaches the RF antenna unit of claim 1, neither the APA nor Trow remedies the deficiencies of Kadomura I. In other words, the RF antenna unit of claim 1 is missing from each of Kadomura I, the APA, and Trow. As none of the references teaches the RF antenna unit of claim 1, the combination of references fails to teach the RF antenna unit of claim 1 or render claim 1 obvious. Applicants respectfully request withdrawal of the rejection.

Claim 24 stands rejected under 35 U.S.C. §103(a) as allegedly being obvious over Kadomura I in view of the APA, Trow, Collins *et al.* (U.S. 5,556,501) (“Collins”), Denholm *et al.* (U.S.

5,911,832), or Tezuka (U.S. 4,771,730).

Claim 24 recites, *inter alia*, “a radio frequency antenna unit..., wherein one of the horizontally-extending coil and the vertically-extending coil comprises an active radio frequency antenna that is electrically coupled to an RF source and other one of the horizontally-extending coil and the vertically-extending coil comprises a parasitic antenna that is not electrically coupled to the RF source, the active radio frequency antenna and the parasitic antenna... inducing radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber.”

Claim 24 is amended for clarification. Support can be found in claim 1 and 38, FIG. 1, and in the specification including paragraph [0028]. Entry of the amendment is respectfully solicited.

As noted above, none of Kadomura I, APA, and Trow teaches a radio frequency antenna unit of claim 24, the unit that includes active and parasitic antennas where the active and parasitic antennas induce radio frequency current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber. Accordingly, at least one of Collins, Denholm and Tezuka must disclose the radio frequency antenna unit of claim 24. Otherwise, none of the references cited against the claim discloses the radio frequency antenna unit of claim 24, and the combination of all references, consequently, will not teach the radio frequency antenna unit of claim 24.

Applicants respectfully submit that none of Collins, Denholm and Tezuka discloses a radio frequency antenna unit of claim 24, the unit that includes active and parasitic antennas where the active and parasitic antennas induces radio frequency current into the plasma chamber and excites and ionizes a process gas so as to generate a plasma in the plasma chamber (See FIG. 1-3 of Collins; FIG. 1-4 of Denholm; and FIG. 1-7 of Tezuka). Accordingly, none of Collins, Denholm, and Tezuka

discloses, a radio frequency antenna unit..., wherein one of the horizontally-extending coil and the vertically-extending coil comprises an active radio frequency antenna that is electrically coupled to an RF source and other one of the horizontally-extending coil and the vertically-extending coil comprises a parasitic antenna that is not electrically coupled to the RF source, the active radio frequency antenna and the parasitic antenna... inducing radio frequency current into the plasma chamber that excites and ionizes a process gas so as to generate a plasma in the plasma chamber," as recited in claim 24.

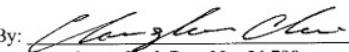
As each and every one of Kadomura I, the APA, Trow, Collins, Denholm and Tezuka fails to teach the radio frequency antenna unit of claim 24, the combination also fails to teach the radio frequency antenna unit of claim 24. In the process, Kadomura I, the APA, Trow, Collins, Denholm and Tezuka, and their combination fail to render claim 24 obvious. Applicants respectfully request withdrawal of the rejection.

Other claims in consideration are each dependent on the independent claims 1, 24, and 38, and believed to be patentable for the same reasons. Since each dependent claims is also deemed to define other aspects of the invention, individual consideration of the patentability of each on its own merit is respectfully requested.

Should the Examiner deem that there is any issue which may be best resolved by telephone, the Examiner is respectfully requested to contact the representative undersigned below. Please charge any additional fees or credit any overpayments to deposit account No. 50-0896.

Respectfully submitted,
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